

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF:

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EXAMINER: V. VASISTH

FILED: OCTOBER 13, 2004

GROUP ART UNIT: 1797

TITLE: LUBRICANT COMPOSITION SUITABLE FOR DIRECT FUEL INJECTED,
CRANKCASE-SCAVENGED TWO-STROKE ENGINES

Wickliffe, Ohio

Hon. Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 C.F.R. §1.132

I, Patrick Mosier, declare as follows:

I received a bachelor's degree in the field of chemistry in 1989 from Purdue University, a master's degree in the field of chemistry in 1991 from the University of Michigan, and a Ph.D. degree in the field of inorganic chemistry in 1995 from the University of Michigan.

I have been employed by The Lubrizol Corporation since 2000. Since that time I have been responsible for development of new chemicals and products to improve the performance of engine oil lubricants. I spent three years as a laboratory chemist investigating new polymeric viscosity modifiers, polymeric dispersants, antioxidants, and anti-wear agents. Subsequent to that, I have spent much of the last six years working as a technology manager in the area of Engine Oils, during which time I have been responsible for development of new components for anti-wear as well as base oil chemistry for Engine Additives. I have general knowledge in the areas of chemical synthesis as well as special knowledge in the area of lubricant additive chemistry.

I am familiar with the invention claimed in the above-mentioned case and with the references which were used in the rejection thereof.

In order to illustrate the improvement in performance of the compositions of the above invention, the following experiments were performed by me: I ordered the

preparation and testing of the indicted materials. For completeness, I include in the table below the three examples that I submitted in my declaration of May 12, 2009. The samples were subjected to the MHT TEOST test which I described in my earlier Declaration. The original results from my earlier declaration are noted in the Table below; all others are new data submitted with this Declaration.

Each of the materials in the examples, below, are the same as those used in my previous declaration, except for the mixture labeled as "Ex. A-8". That is the mixture prepared according the Example A-8 of Blythe, US 5,264,005, as described in the declaration of Dr. Delbridge.

Mat'l, %	Comparative Ex 1 ← designation in prev. decl. →						Reference Inventive Ex 1 Ex 3						
	C1	C2	C3	C4	C5	C6	C7	Ex1	Ex2*	C8	C9	C10	C11
Mineral oil (a)	83.7	92	92	84	89	88	83.7	87	47	91	90	92	88.25
Cond'n prod (b-1)	4.3				5		4.3	5	4.8	0.5	8	2	5
Mannich dispt. (b-2)		7.04				5.28	5.28	5.28	5.28	7.04	0.88	2.64	5.28
Ex. A-8					6	6							
Amino-phenol	7.2		4.8	9.6			3.6						
Solvent* (c)									40* virtual				
Amine AO (d)								2	2	0.5	1	2	0.75
%N	0.34	--	--	--	--	--	0.38	0.47	--	--	--	--	--
MHT TEOST (mg total)	57.4	88.4	76.3	39.4	37	36.1	28.2	7.3	0.3	59.6	31.2	50.5	43.8

* Calculated as though 40% volatile solvent were present, although for this test, volatile solvent is not permitted, as I discuss below.

Each of the materials is presented here on an oil-free, active chemical basis. That is, the Mannich dispersant employed was supplied containing about 12% diluent oil; this amount has been subtracted from the amount of Mannich dispersant listed in the table, so that the amount reflects the active chemical. (This small amount of diluent oil has not been added into the listed amount for the mineral oil, component (a)). Similarly, the amino phenol material as supplied contained about 40% mineral oil. This has been treated in the same way.

By way of explanation of Example 2, which is listed as containing a "virtual" amount of 40% oil: It is well known, in the field of two-cycle engine lubricants, that lubricant compositions are typically mixed with a fuel such as gasoline and then are delivered to the engine as the additive-fuel mixture. In the engine, the fuel evaporates and is eventually burned, leaving the less volatile or non-volatile lubricant components to lubricate the metal parts of the engine (before ultimately also being combusted). The mixing of the lubricant formulation with the fuel typically occurs in the fuel tank of the vehicle, or shortly before the fuel is added to the fuel tank, and in order to aid in the mixing, a low viscosity combustible solvent is often included with two-cycle lubricant formulations. This solvent reduces the viscosity of the lubricant composition so that it will more readily mix with the fuel. Thereafter, the combustible solvent becomes, in effect, a part of the fuel and is consumed along with the fuel. Thus, after the lubricant and solvent combination is mixed with the fuel, the solvent no longer plays any role in the lubrication of the engine. The lubrication is effected by the oil and the other additives.

For this reason, no solvent was included in the materials that I tested for deposit formation. Indeed, the MHT TEOST test that I used to evaluate the lubricants cannot tolerate the presences of volatile, combustible solvent. However, in my opinion, this test as performed without solvent provides a fair test of the lubricant performance, regardless of whether solvent is included in the formulation when it is actually used in a gasoline mixture in a 2-cycle engine.

The only effect that replacing some of the oil of lubricating viscosity with solvent will have is to decrease the amount of oil in the formulation relative the amount of other non-volatile additives. I designed Example 2 in the table above to have a lower relative amount of oil, as would be typical if there were 40% volatile combustible solvent present. However, the solvent was not physically present for the reasons I have discussed. This is why I have labeled it as "40% (virtual)." The amounts of materials as actually used in the test, normalized to 100%, are (a) mineral oil 78.7%, (b-1) condensa-

tion product 8%, (b-2) Mannich dispersant 8.8%, and diphenylamine antioxidant 3.3%. The results under these conditions showed excellent deposit performance of only 0.3 mg.

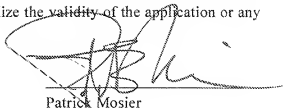
The results of the testing shows that at very low concentrations of either the Mannich dispersant or of the condensation product, the deposit performance deteriorates. Thus the deposits are much higher when the amount of the Mannich dispersant is absent or is present at only 0.88 percent (Comparative Example 9). The deposits are also much higher when the condensation product (b-1) is absent or is present at only 0.5 or 2 percent (Comparative Examples 8 and 10).

Similarly, if the amine antioxidant is omitted or is present at only 0.5 or 0.75 % (Comparative Examples 8 and 11), poor results are obtained, even though the required dispersant components are present (Comparative Example 11). The presence of the aminophenol material disclosed in Blythe (Comparative Example 7) does not provide acceptable results if the amine antioxidant is omitted.

Comparative Examples 5 and 6 show that the complex mixture of Example A-8 of the Blythe reference does not provide good results when it is used to replace either the Mannich dispersant of the condensation product.

However, Examples 1 and 2, containing the materials of the present invention in the correct amounts, provide very good deposits results, of only 7.3 and 0.3 mg deposits.

I further declare that all statements herein made of my own knowledge are true and all statements herein made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.



Patrick Mosier

12/10/2009 (date)